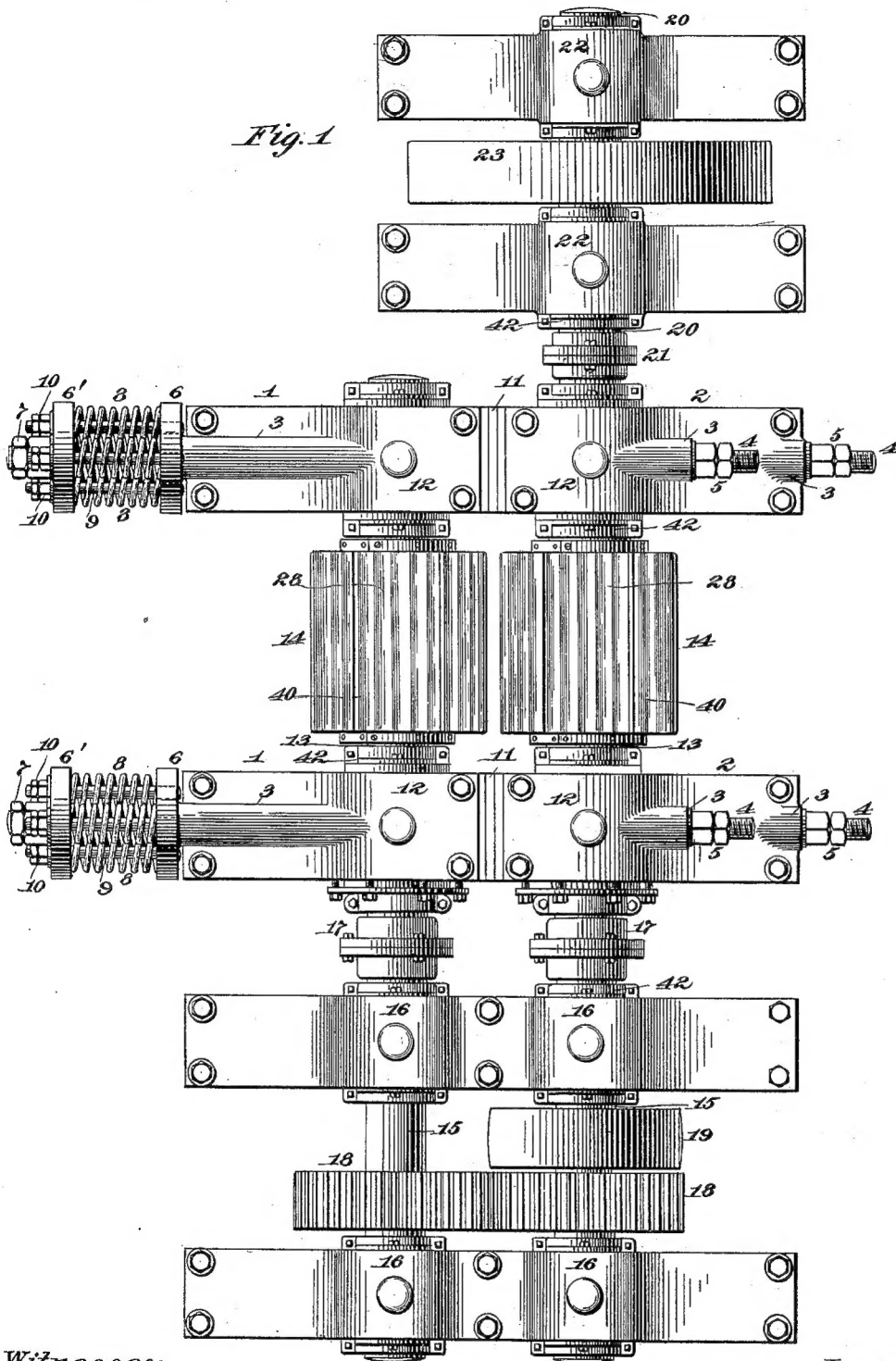


T. A. EDISON.
GRINDING OR CRUSHING ROLLS.

(Application filed May 23, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

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T. A. EDISON.
GRINDING OR CRUSHING ROLLS.

(No Model.)

(Application filed May 23, 1898.)

2 Sheets—Sheet 2.

Fig. 2

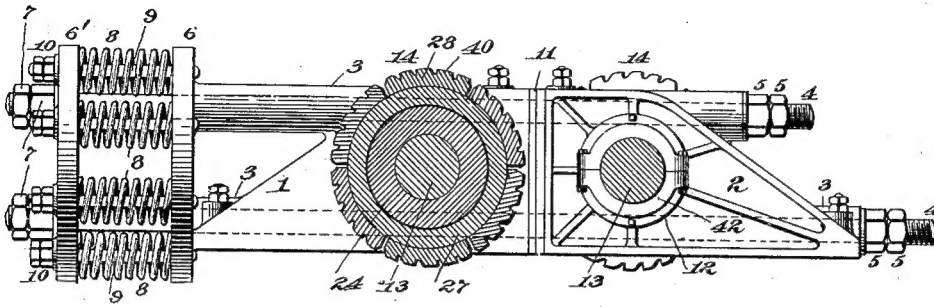


Fig. 3

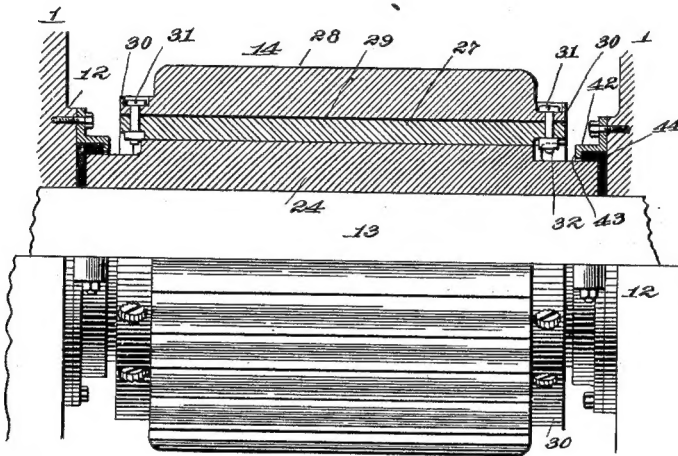


Fig. 5

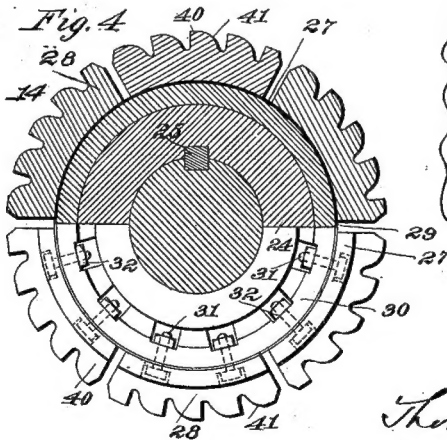
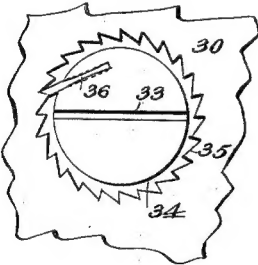
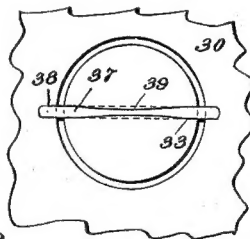


Fig. 6



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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

GRINDING OR CRUSHING ROLLS.

SPECIFICATION forming part of Letters Patent No. 674,057, dated May 14, 1901.

Application filed May 23, 1898. Serial No. 681,478. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Grinding or Crushing Rolls, (Case No. 993,) of which the following is a specification.

My invention relates to various improvements in rolls for grinding or crushing material in bulk, such as iron ore; and the improvements relate especially to details of construction by which the general efficiency of such rolls will be improved.

Broadly considered, my invention comprises two heavy metal rolls with the grinding-surfaces arranged close together or in actual contact, said grinding-surfaces being composed of suitably corrugated or roughened steel plates, buffer-springs being provided to keep the rolls in their normal positions, but allowing for lateral movements thereof in operation, the rolls being positively geared together and the driving-shafts being provided with wabbling connections to allow for any lateral movements of the rolls.

In order that my invention may be better understood, attention is directed to the accompanying drawings, forming part of this specification, and in which—

Figure 1 is a plan view of my improved crushing-rolls, showing the employment of a fly-wheel therewith; Fig. 2, a transverse section on the line 2 2 of Fig. 1; Fig. 3, an enlarged detail view of one of the rolls, showing the same partly in section and partly in elevation and illustrating an improved form of dust-bearing therefor; Fig. 4, a half cross-section and half end elevation of the same roll; Fig. 5, an enlarged detail view of the preferred form of bolt-lock for the same, and Fig. 6 a similar view of a modification of said bolt-lock.

In all of the above views corresponding parts are represented by the same numerals of reference.

The side frames are each made of two separate castings 1 and 2, as shown, which are mounted on suitable skids or foundation-beams, (not illustrated,) the sections of each side frame being movable slightly with respect to the foundation. Extending through

sleeves 3 3 of the sections 1 and 2 of each side frame are heavy connecting-bolts 4, provided at one end with adjusting-nuts 5 5. These connecting-bolts provide for securing a very rigid side frame and at the same time allow for the necessary lateral movements thereof. At one side of the device the connecting-bolts 4 pass through two compression-plates 6 and 6', the former of said plates being held in constant engagement with the sleeves 3 3 of the section 1 of the side frames, and, if desired, the said compression-plate 6 may be formed integral with the said sleeves. The said compression-plate 6 is maintained in a vertical plane, and the upper sleeve 3 of each side frame 1 is therefore elongated, as shown. The connecting-bolts 4 are provided at their other ends with adjusting-nuts 7 7, engaging the compression-plate 6'. The compression-plates 6 and 6' are provided between them with heavy spiral springs 8, surrounding the bolts 9, the latter bolts being provided with adjusting-nuts 10 10, by which the tension of said springs may be regulated. Instead of employing spiral springs for this purpose rubber buffers may be used. The sections 1 and 2 of each side frame are separated to the proper extent by means of blocks or plates 11, inserted between them and having openings therein through which the connecting-bolts 4 pass. These blocks 11 may be made of wood or metal, preferably the former, in order that slight elasticity thereof may be secured.

The side frames of the device are provided with heavy bearing-boxes 12, in which are mounted the two parallel shafts 13, carrying the grinding-rolls 14. The shafts 13 are connected outside of the rolls to shafts 15 15, which are mounted in suitable stationary bearings 16 16. The shafts 15 and 13 are connected together by a suitable wabbling connection 17, by means of which the said shafts will rotate together, but provision will be made for lateral movements of the shafts 13. The said wabbling connections may be of any suitable construction. The shafts 15 15 are geared together by suitable intermeshing gears 18, so that the two rolls 14 14 will be rotated simultaneously. Power is applied to one of the shafts 15 through a suitable driving-pulley 19. If it is desired to use a fly-

wheel with the device to obtain uniformity of motion, a shaft 20 may be connected to one of the shafts 13 at the other side of the device through a wabbling connection 21. The said shaft 20 is mounted in stationary bearings 22, and between said bearings it is provided with a heavy fly-wheel 23, keyed thereto.

Each crushing or grinding roll 14 is composed, preferably, of a central cast core 24, keyed to the shaft 13 by a heavy key 25. Mounted on said core is a cylindrical drum or ring 27. The said drum may be shrunk onto the core or be secured thereto in any suitable way. Carried on the outside of the drum 27 are the grinding or crushing plates 28, a layer 29 of some soft metal, such as zinc or lead, being interposed between said grinding-plates and the drum 27 to provide an absolutely-solid bearing throughout the entire area of said plates. The grinding or crushing plates 28 are provided at their edges with projecting rings 30, through which bolts 31 pass through the edges of the drum 27. Some means are provided to prevent the bolts 31 from becoming accidentally dislodged, since they are subject to excessive vibration and would otherwise quickly work loose. In Figs. 5 and 6 I illustrate improved forms of locking devices for this purpose. The nuts 32 of the bolts 31 are mounted in recesses formed on the interior of the drum 27, so that said nuts cannot turn. The heads of the bolts 31 are provided with kerfs 33, so that said bolts can be screwed into the nuts by a heavy screw-driver. In Fig. 5 the projections 30, formed on the crushing or grinding plates 28, are provided with recesses 34, the edges of which are serrated at 35, as shown. After the bolts have been screwed tightly home a small locking-piece 36 is driven down in a slot cut in the heads of the bolt, the outer edge of said locking-piece engaging one of the teeth 35, so that the bolt will be effectively prevented from working loose. This locking-piece may be held in place by burring over a part of the bolt-head upon it. In the construction shown in Fig. 6 the bolt will be prevented from working loose by a steel pin 37, which is introduced into the kerf of the bolt-head and engages small recesses 38, which are chiseled out of the sides of the sockets 34. After the pin has been driven in place the head of the bolt is burred over at 39 to hold it in position.

The peripheries of the grinding-plates 28 are provided with corrugations 40 therein, having curved grinding-surfaces 41, which engage the material and effectively reduce the same. As shown in Fig. 4, the curve of each corrugation is struck on a short radius extending substantially parallel with the tangent of the roll, whereby the upper surface of each corrugation will extend substantially concentric with the axis of the roll. I find in practice that with grinding-plates which are thus corrugated there is much less wear and

better results are obtained than in plates provided with regular corrugations, since there are flat portions which work closely together in line with the horizontal axes of the rolls and which serve to reduce the material to its finest size.

In the crushing of iron ore or other material the dust of which tends to cut out and injure bearings I find it necessary to provide dust-guards for the several bearings which are used, and in Fig. 3 I illustrate the preferred form of dust-guard, showing the same in use on the bearings for one of the shafts 13. The said dust-guard comprises simply a split casing 42, having an inturned flange 43, which is in close engagement with the moving surface, and within said casing is forced a supply of waste or other soft material 44, which not only excludes dust, but prevents the exudation of oil from the bearings.

It will be observed that by employing the heavy spiral springs 8, tending to force the two compression-plates 6 and 6' apart, the rolls will be held in their normal positions with the desired-stress, but that in the event of very heavy particles, unusually hard particles, or an abnormal supply of material the rolls will separate slightly against the tension of said springs. By providing wabbling connections between the shafts 13 and 15 the rolls will be positively driven, and at the same time any lateral movements of the rolls will not affect the correct operation of the gearing.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is as follows:

1. In a grinding or crushing mill, the combination of the two side frames, each made in two parts with essentially parallel abutting edges, connecting-bolts passing through sleeves cast integrally with the sections of the side frames to permit relative movement of said sections, a compression-plate connected to one section of each side frame, a second compression-plate connected to the connecting-bolts on each side, compression-springs between said plates tending by their elasticity to hold the sections of each side frame together, two shafts carried in bearings in corresponding sections of the side frames, grinding or crushing rolls carried by said shafts, two driving-shafts mounted approximately in line with the shafts of said rolls but in stationary bearings, gearing between said driving-shafts, and wabbling connections between the driving-shafts and the corresponding shafts of the grinding or crushing rolls, substantially as set forth.

2. In a grinding or crushing mill, the combination of the two side frames, each made in two parts with essentially parallel abutting edges, connecting-bolts passing through sleeves cast integrally with the sections of the side frames to permit relative movement of said sections, a compression-plate connected to one section of each side frame, a second

compression-plate connected to the connecting-bolts on each side, compression-springs between said plates tending by their elasticity to hold the sections of each side frame together, two shafts carried in bearings in corresponding sections of the side frames, grinding or crushing rolls carried by said shafts, two driving-shafts mounted approximately in line with the shafts of said rolls but in stationary bearings, gearing between said driving-shafts, wabbling connections between the driving-shafts and the corresponding shafts of the grinding or crushing rolls, a fly-wheel shaft mounted in stationary bearings approximately in line with one of the shafts of the grinding or crushing rolls opposite to the driving-shaft therefor, and a wabbling connection between the fly-wheel shaft and the said shaft of the grinding or crushing rolls, substantially as set forth.

3. In a grinding or crushing mill, the combination of the two side frames, each made in two parts with essentially parallel abutting edges, connecting-bolts passing through sleeves cast integrally with the sections of the

side frames to permit relative movement of said sections, a compression-plate connected to one section of each side frame, a second compression-plate connected to the connecting-bolts on each side, compression-springs to hold the sections of each side frame together, two shafts carried in bearings in corresponding sections of the side frames, grinding or crushing rolls carried by said shafts, two driving-shafts mounted approximately in line with the shafts of said rolls but in stationary bearings, gearing between said driving-shafts, wabbling connections between the driving-shafts and the corresponding shafts of the grinding or crushing rolls, and spacing-blocks between the adjacent sections of the side frames, substantially as set forth.

This specification signed and witnessed this 11th day of April, 1898.

THOMAS A. EDISON.

Witnesses:

J. F. RANDOLPH,
F. C. DEVONALD.